

Swanson, Greg

From: HORIUCHI, GAIL K. (JSC-EM) (NASA) [gail.k.horiuchi1@jsc.nasa.gov]
Sent: Wednesday, November 21, 2001 11:56 AM
To: Wells, Doug; McGill, Preston; Munafo, Paul; Bhat, Biliyar; Jones, Chip
Cc: Swanson, Greg; Gregg, Wayne; HORIUCHI, GAIL K. (JSC-EM) (NASA); FORMAN, ROYCE G. (JSC-EM) (NASA); ECORD, GLENN M. (JSC-ES4) (NASA); BECKMAN, KEITH A. (JSC-ES) (NASA); JACOBS, JEREMY B. (JSC-ES4) (NASA)
Subject: RE: Orbiter landing gear issue

Thanks Doug and Preston for all the time and help.

Royce got some verbal description from LaRC on their tests. And we should be getting the results sometime today - we will forward it on as soon as we receive it. They cycled at 75% of the yield strength on both a corrosion pit and an EDM slot. They found that the EDM slot may have started cracking first, but the total life was the same. Presumably the EDM recast layer cracks fast - our test here may collaborate that. We cycled an EDM slot here to determine the crack growth detect-ability with Eddy Current, and noticed the largest Eddy current response after the first 5,000 cycles. We are in the process of sectioning it and looking at it in the SEM today (the same procedure we will use on the wheel from Goodrich). We'll let you know what we find.

Thanks again, everyone have a great Thanksgiving,

Gail

-----Original Message-----

From: Wells, Doug [mailto:Douglas.N.Wells@msfc.nasa.gov]
Sent: Tuesday, November 20, 2001 6:09 PM
To: McGill, Preston; Munafo, Paul; Bhat, Biliyar; Jones, Chip
Cc: Swanson, Greg; Gregg, Wayne; 'HORIUCHI, GAIL K. (JSC-EM) (NASA)'
Subject: Orbiter landing gear issue

This is a summary of conversations held with the JSC folks on the orbiter wheel corrosion issue.

Gail Horiuchi from JSC called today to discuss a line item on their L-2 FRR charts that indicated MSFC's support for the rationale for flight for the orbiter wheels which have corrosion pits. Greg Swanson, Wayne Gregg and I held a brief telecon with the folks at JSC: Gail, Royce, et al. The initial statement presented to us implied we had reviewed the fracture analysis, the test approach, and based on the test approach, we approved the rationale for flight. We altered this slightly to de-emphasize the fracture assessment (I don't believe one exists which shows life) and altered our supporting statement to include all the supporting parts of the rationale, because I believe the full story is required to support the rationale. In my mind, the rationale centers around the fact that a good sample of the wheels in the fleet (7 of 30?) showed that the pitting exists without associated cracking and therefore the pits can be treated only as pits - not cracks. This allows the test data from the landing gear test rig at WPAFB with edm notches in critical areas of the wheel to support the rationale. The test is not attempting to show life on a crack-like defect, but on a defect of similar severity to the corrosion pits. The EDM notches survived 3 landings and 1 abort load case without any signs of cracking (still investigating). This does not help me to assess the life of a crack-like defect, but does tell me that the wheel should adequately tolerate the discontinuity of the corrosion pit. LaRC also has some data available to show that from a standard fatigue perspective, the EDM and corrosion pit are roughly equivalent. (We were not able to tell if this fatigue scenario was LCF or HCF).

Rationale for flight for the NDE flaw is still a question (wheels are fracture critical), but setting up a rationale that allows the corrosion pit to be separated into a non-crack-like category based on the investigation of the pits on a number of wheels allows the WPAFB base test to support flying with potential corrosion at reasonable risk. The flight rationale against crack-like defects would be the same as it has been for the last 20 years. I currently understand that the fracture life assessment was agreed to based on tests similar to those run recently at WPAFB.

This is likely too short to be coherent. I will be in VA from Wed. to Mon. Call at 804-836-5610 if needed.

Greg, Wayne and Gail: reply with clarifications if need be.

thanks,
doug